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ary, the population of the house flies decreases considerably and not even a single parasitized fly was observed.

The maximum number of the mite observed on a single house fly was 24 and minimum 8. Usually all the mites occurred gregariously sucking the fluid of the host body. The most preferred feeding point was the bases of hind coxae. Besides this, the other attacked parts of the host are, wing axillaries, head haustellum, arthroal membrane of the tergites and

sternites of the abdomen.

Previously, Roy and Brown (1970) observed *Pyemotes ventricosus* Newport causing dermatitis in human being. In view of this, the present *Pyemotes* sp. of mite parasitizing the house fly may cause dermatitis in man as it can be easily transferred by the host insect.

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## 26. PREDATORY ANTS OF THE MOUND BUILDING TERMITE, *ODONTOTERMES WALLONENSIS* (WASMANN) WITH SPECIAL REFERENCE TO THE PREDATORY BEHAVIOUR OF *LEPTOGENYS PROCESSIONALIS* (JERDON)

### INTRODUCTION

Termites have many enemies including both invertebrates and vertebrates. Among the invertebrates the best known predators are ants which prey on all stages of termites. They capture termites at the time of swarming, foraging and construction and expansion of their nests. From India Mathur (1962) has listed the following species of ants as enemies of termites *Acantholepis fravenfeldi* Mayr, *Camponotus compressus* Fab. (Formicinae);

*Crematogaster* sp., *Monomorium destructor* Jerd., *M. indicum* Forel, (Myrmicinae) and *Leptogenys diminuta* Smith (Ponerinae). Negi (1934) reported *Leptogenys processionalis* as an active predator of termites.

Wheeler (1936) reported that several species of ants attack termites in the colonies and deplete and destroy the population. He recognised four categories of predatory ants. 1. Cleptobiotic ants: Ants which attack other ants and wrest their prey from them.

2. Termitolestic ants : Ants which live in the walls or partitions of the nests of termites and prey on them.
3. Inquiline ants : These ants are extremely aggressive. They occupy portions of inhabited or abandoned mounds.
4. Termitharpactic ants : Ants such as Ponerines, Dorylines and Myrmicines. They habitually raid colonies of termites which constitute a large proportion of their food.

The available reports on predatory ants of termites are scanty though of general interest. An attempt has therefore been made to investigate the various species of ants associated with termites.

#### MATERIAL AND METHODS

Observations were made on the various species of predatory ants at the Campus of the University of Agricultural Sciences, Hebbal, during 1976-78. Field visits were made periodically to the foraging sites and mounds of *Odontotermes wallonensis* and also to light sources during the monsoon season, to record the different species of ants. The predatory activity of *Leptogenys processionalis* was observed regularly during the summer (February and March) and the monsoon (July and August) seasons of 1978, by visiting the study site both in the mornings (between 0700 h to 1100 h) and in the evenings (between 1630 h to 2100 h). However, counts were made only during the morning hours. The total number of workers returning with termites was recorded at the nest. The enumeration, in each case, was performed continuously for 5 minutes using a tally counter. The correlation between the predatory activity of ants and weather factors has been worked out and presented in Tables 1 and 2.

#### RESULTS AND DISCUSSION

During the present investigation the following ant species were encountered as predators of *Odontotermes wallonensis*.

##### FORMICIDAE

###### I. PONERINAE

1. *Diacamma rugosum* (Le Guillou)
2. *Leptogenys laeviceps* (F. Smith)
3. *Leptogenys processionalis* (Jerd.)

###### II. FORMICINAE

4. *Anoplolepis longipes* (Jerd.)
5. *Camponotus rufoglaucus* (Jerd.)
6. *Camponotus sericeus* Fab.
7. *Oecophylla smaragdina* Fab.

###### III. MYRMICINAE

8. *Crematogaster hodgsoni* Forel
9. *Leptomyrmex quadrispinosus* Jerd.
10. *Monomorium floricola* Jerd.
11. *Monomorium latinode* Mayr
12. *Myrmecaria brunnea* Saunders
13. *Solenopsis geminata* Mayr
14. *Tetramorium smithi* Mayr

###### IV. PSEUDOMYRMICINAE

15. *Tetraoponera rufonigra* (Jerd.)

###### V. DOLICHODERINAE

16. *Tapinoma melanocephalum* Fab.

These species of ants attacked those termites which emerged from their mounds or were engaged in activities such as foraging and nest construction under the conditions prevailing in Bangalore. The Ponerine ant, *Leptogenys processionalis*, was found to be an important predator of this species throughout the year. However, with the onset of the monsoon, the activity of this ant reached a peak. With the coming of rains, termite activities, like construction and expansion of the nest, food collection and alate emergence, reached a peak. It is a common sight to see moving columns of these ants fanning out at the foraging arena, in fields and grasslands, and along and across footpaths and roads. In the morning they are active between 0700 h to 1100 h. While in the evenings they are active between 1630 h

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to 2100 h. On summer evenings their activity could extend upto 2300 h.

Initially, when searching for prey, these ants move in single file. Once they encounter the earthen sheathing of the termites they fan out in all directions. The ants first confirm the presence of termites by tapping their heads on the earthen foraging runways. They then proceed to find weak points in the runways.

Once the walls are breached at these points, they start attacking the termites by producing a "hissing" sound. Mukerji (1931), reported that *L. pequeti*, a related species, too moved in files and made stridulatory sounds audible at a distance. Intense, continuous fighting was observed between the ants and the termite soldiers until the ants ultimately over-powered the termites by holding them in their mandibles

TABLE 1

PREDATORY ACTIVITY OF *L. processionalis* ON *Odontotermes wallonensis* DURING FEBRUARY-MARCH 1978 AT HEBBAL CAMPUS

Date of observation	No. of ants returning from the foraging site/5 min.	No. of ants carrying termites	Per cent predators	Distance from nest to foraging site (in meter)
3-2-78	95	61	64.21	20
4-2-78	187	52	27.80	16
6-2-78	217	71	32.71	12
7-2-78	198	87	43.93	10
8-2-78	61	20	32.78	9
9-2-78	236	121	51.27	15
10-2-78	119	92	77.31	14
12-2-78	191	83	43.45	10
13-2-78	182	98	53.84	10
14-2-78	282	116	41.13	13
15-2-78	394	144	36.54	9
17-2-78	302	112	37.08	10
21-2-78	145	54	37.24	12
22-2-78	165	49	29.69	11
23-2-78	211	86	40.75	8
24-2-78	307	157	51.14	14
26-2-78	392	66	16.83	15
28-2-78	108	1	0.92	18
8-3-78	265	115	43.39	16
14-3-78	210	95	47.26	9
15-3-78	112	54	48.21	19
Total	4379	1734	857.48	270
Range	61 to 394	1 to 157	0.92 to 77.31	9 to 20
Mean with standard deviation	208.53 ± 90.98	82.58 ± 38.39	48.84 ± 15.85	12.86 ± 3.56

21 observations from 3-2-1978 to 15-3-1978.

and stinging them with arched abdomen. Thus paralysed, they carried the termites positioned between their legs and clasped between clenched mandibles, back to their nests. The number of columns was dependant on the abundance of the available food.

When termite mounds were exposed thousands of these ants appeared suddenly and attacked the workers and nymphs of the termites. In a few weak termite colonies, the ants exterminated the colonies totally and occupied the mounds. Ant nests were also observed on the surface and in the vicinity of mounds. A maximum of ten ant nest openings were observed on the surface of a single mound.

The predatory behaviour of *L. processionalis* was observed during February and March 1978. The extent of predation is presented in Table 1.

Percentage predation of *L. processionalis* was worked out by counting both the total

number of workers returning to the nest and the number of workers with termites returning to the nest. The per cent predation was found to vary from 0.92 to 77.31 per cent with an average of  $40.84 \pm 15.85$  per cent.

When termites were available in plenty, the species concentrated only on them. *L. processionalis* was active throughout the year. They were more active in the monsoon season with their activity declining to a minimum during the summer season. They were particularly active on days preceded by rains as this coincided with alate emergence and nest expansion by termites.

In July, in one instance, the distance between the ant nest and the foraging site was found to be 15 cm and they were active from 0900 h to 1300 h. In the month of August similar activity was observed between 0800 h to 1000 hr. The number of ants transporting termites to their nest was 9990 in 4.5 h. in July (Average rate of predation being 37 termites per

TABLE 2

EXTENT OF ANT PREDATION AS INFLUENCED BY WEATHER PARAMETERS DURING THE SUMMER (FEB.-MARCH) SEASON OF 1978, AT HEBBAL.

	Temperature		Relative humidity	
	Maximum	Minimum	Morning	Evening
1. No. of ants returning from the foraging site	+ 0.0587	- 0.3191	+ 0.0971	+ 0.0665
2. No. of ants carrying termites	+ 0.0814	+ 0.1398	+ 0.2902	- 0.4489*
3. Percent predatism	+ 0.1227	+ 0.5073*	+ 0.4620*	+ 0.1997
	No. of ants returning from foraging site		No. of ants carrying termites	
1. Distance from the nest to the foraging site	- 0.2298		- 0.2571	
2. No. of ants carrying termites	+ 0.7011**		—	
			Per cent predatism	
			+0.0087	
			+0.4882*	

n = 21 Correlation co-efficient values at 5% and 1% at n = 21 are 0.423 and 0.537 respectively.

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minute) and 3132 in 2 h in August (The average rate of predation being 26 termites per minute).

The inter-relationship between the predatory activity of ants and the weather parameters, like temperature and humidity, during 1978, is presented in Table 2. Maximum temperature did not significantly influence the foraging behaviour of ants, whereas minimum temperature appeared to influence negatively the population of ants returning from the foraging site, while it has a positive influence on per cent predation. This indicates that lower temperature increase predation of termites by ants, perhaps because lower temperature causes more movement of termites for foraging. This helps in ants being attracted to the foraging sites. Likewise, predation is positively influenced by relative humidity in the morning hours perhaps because the termites forage during the cooler hours, in humid weather.

The number of ants carrying termites decreased with increasing distance between the nest and the foraging arena as is evident from the negative relationship in Table 2.

*C. sericeus*, *A. longipes* (Formicinae) and

*D. rugosum* (Ponerinae) attacked the termites at the time of mound construction and alate emergence during the night. They attacked those alate forms which had dropped their wings by basal fracture. These were also found nesting in the peripheral region of mounds. *O. smaragdina* was observed more in the foraging sites of termites, on grass and trees.

Among the other species of ants, *C. hodgsoni* and *I. rufonigra* were found associated with termites when the nest was exposed. The nests of *C. hodgsoni* were noticed in the upper regions of the mound, and measured 3 × 5 cm in diameter. Although *T. smithi* prey on termites they were not found to directly attack the termites but seemed to prefer wresting their prey from other ants.

*Tapinoma melanocephalum*, the only species under Dolichoderinae was observed quite frequently in large numbers and were found attacking the exposed nymphs and workers and termites. During the current period of study, only in ten cases were these ants found to be dragging the alate reproductives of termites to their nests by holding on to their wings.

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